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(54) **VALVE CONSTRUCTION**
KONSTRUKTION EINES VENTILS
CONSTRUCTION DE SOUPAPE

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Description

Background of the Invention

It is the universal aim of valve designers to improve operating performance, reduce size relative to flow capacity, and to lower production costs.

In the past, valve bodies have been formed by extensive machining of solid material and more recently valve bodies have been die cast from metal or injection molded from plastic materials. Die casting has distinct advantages over machined valve bodies because of free holes and extra shaping which can be obtained. Even more sophisticated valve body configurations are possible through plastic molding.

However, die cast and molded valve bodies, as currently designed and produced, generally require substantial machining, port thread inserts, retaining caps, gaskets, and assembly screws. To form internal channels that intersect, expensive drilling and plugging operations are necessary. Further, grooves and large internal galleries are not normally formed in the molding process, because core pin removal would be impossible. Therefore, extra parts are required to form galleries and grooves which consume space and add to the overall cost of the valve.

Many valves include push-in fittings, in which the flow tubes can be inserted and removed from the valve body without the use of a tool. The normal push-in fitting consists of a threaded body, a collet to attach the body to the tube and an O-ring seal. The body of the fitting represents the major share of the cost and size of the fitting.

Exhaust silencing is also used with many pneumatic valves and this is accomplished by turning conically shaped sintered metal elements into the valve exhaust port. In most situations the valve silencing element is required to be installed by the valve user, which adds to the overall cost of the valve.

US-A-3092141 which forms a basis for the preamble of claim 1 discloses a valve with plural body sections which mate with one another.

The invention is directed to an improved valve construction in which the body of the valve is formed in two or more layers of sections which are joined at interfaces that lie in planes parallel to the direction of operation of the operating components of the valve.

According to the present invention, there is provided a valve construction comprising a body including a plurality of body sections each having an inner surface, said inner surfaces being disposed in contiguous relation along an interface, each inner surface having a plurality of channel portions each mating with complementary channel portions in the surface of the body section to form fluid channels, and means for introducing an operating fluid in said channels, characterised by:

said channels forming a main fluid channel and a pilot channel, valve means mounted for movement in said main channel for controlling the flow of fluid through said main channel, and pressure responsive pilot means communicating with said pilot channel and operably connected to said valve means and responsive to a predetermined pressure of said fluid in said pilot channel for moving said valve means in said main fluid channel to thereby control the flow of fluid in said main channel.

In addition, the inner surface of each body section is also formed with a plurality of channel portions that mate with and complement channel portions in the inner surface of the other body section to form channels that interconnect the compartments.

Also formed in the inner surface of each body section are a plurality of port sections which mate with port sections that mate with and complement channel portions in the inner surface of the other body section to form channels that interconnect the compartments.

Also formed in the inner surface of each body section are a plurality of port sections which mate with port sections in the inner surface of the other body section to form ports. The ports establish communication between the channels and the exterior of the valve body.

The two body sections are preferably formed by molding of plastic material and the contiguous surfaces of the two body sections can be connected together by various means including ultrasonic welding or adhesives.

With the invention, the two body sections are virtually mirror images of each other and the flow channels and recesses for internal components are formed partially, but not necessarily equally, in each body section.

To assemble the valve, the internal parts are dropped into the compartment recesses of one of the valve body sections and the second body section is then placed over the first section, with the components or internal parts seating within the recesses in the second body section. The two layers are then joined together to provide the completed valve body.

With this construction, all of the internal components are automatically trapped in place and all channels are formed and sealed. There is no need for additional machining, port inserts, retaining caps, or assembly screws, as is necessary in conventional valve constructions. In addition, all electrical components, such as solenoids, are encapsulated in the body and are shielded from the outside environment.

The construction of the invention provides increased power density, i.e. flow capacity relative to size, because the flow channels, although narrow,can be deep, sinuous and aerodynamically shaped. This shaping reduces turbulence by eliminating sharp corners and abrupt changes in the flow direction that normally impede the movement of fluids in a conventional valve construction.

The valve construction of the invention is more compact than conventional types and the compactness results from the ability to optimize the position of each in-

ternal component without regard to the usual limitations associated with tool access or core pin pulls.

Assembly of the layered body sections is considerably simpler than assembly of traditionally designed valves, because the entire operating area is laid open prior to sealing. The internal components may be easily placed into position in the open side of one of the body sections rather than being pushed into internal grooves and blind holes as in a conventional valve design. Further, because the closure of the body sections traps and locates all internal parts, space is not consumed by the presence of retaining caps and fasteners.

As a feature of the invention, the body portion of the push-in fitting is formed integrally with the valve body. With the invention, the collet and O-ring are mounted in the specially designed ports of the body, with the valve body itself serving to support the collet. This eliminates the need for a push-in fitting body, which is required with conventional valve constructions.

As a further feature of the invention, valve exhaust silencing can be incorporated in the exhaust or outlet port of the valve. With this construction, a block or plate of sintered metal silencing material can be entrapped in recesses in the valve body sections during assembly, so that the valve silencing is incorporated directly with the valve body and it is not necessary to attach auxiliary silencing components to the body, as in conventional constructions.

The valve construction of the invention significantly improves power density, compactness, cost effectiveness, and general utility of the valve. The invention allows the entire operating section to be formed with all required passages, grooves and galleries, by simply bringing the two body sections together in mating relation.

Other objects and advantages will appear in the course of the following description

Description of the Drawings

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

Fig. 1 is a perspective view of a valve constructed in accordance with the invention;

Fig. 2 is a section taken along line 2-2 of

Fig. 1 and showing the inner surface of one of the body sections with the internal components placed therein;

Fig. 3 is a section taken along line 3-3 of Fig. 2;

Fig. 4 is a section taken along line 4-4 of Fig. 2;

Fig. 5 is a section taken along line 5-5 of Fig. 2; and

Fig. 6 is a perspective view of the collet of a push-in fitting.

Description of the Illustrated Embodiment

The drawings illustrate a valve construction, such as a pneumatic valve construction, which includes a body 1 formed of a pair of body sections 2a and 2b. Body sections 2a and 2b are molded from either a plastic material or metal, and each body section includes a generally flat inner surface 3. The surfaces 3 are positioned in contiguous flatwise relation along an interface and are bonded together by some means such as ultrasonic welding or an adhesive.

Fig. 2 shows the invention as applied to a single solenoid piloted pneumatic valve, but the invention is not limited to this particular valve construction and is adapted to be used with a wide variety of valve constructions.

Fig. 2 is a section taken along the interface between surfaces 3 of body sections 2a and 2b. As illustrated in Fig. 2, valve body 1 includes an inlet port 4 which is connected to a source of air or other fluid and the inner end of port 4 communicates with a valve chamber or compartment 5. Channel or passage 6 connects the valve compartment 5 with a port 7, which can be connected, for example, to one end of a fluid cylinder. A passage 8 connects valve compartment 5 with a second valve chamber or compartment 9.

The body 1 is also provided with an outlet or exhaust port 10 and channels or passages 11 and 12 connect the exhaust port with the valve compartments 9 and 5, respectively. In addition, a passage 13 is connected between valve compartment 9 and port 14, which can be connected to the opposite end of the fluid cylinder.

Also included in valve body 1 is a passage or pilot channel 15 which interconnects the valve passage 8 and a chamber or compartment 65 which communicates with the larger diameter solenoid chamber 16. Passage or pilot channel 17 connects the end of the compartment 65 with the ends of the valve compartments 9 and 5. To permit passage 17 to pass across the passage 8, a tube 18 having a lesser cross sectional area than passage 8 intersects the passage 8. As shown in Fig. 4, the ends of tube 18 bear against shoulders in valve body 1 to prevent displacement of the tube, and O-ring seals 19 are positioned in mating grooves in body sections 2a and 2b to seal the tube to the valve body.

The interface between the body sections 2a and 2b intersects the ports 4, 7 and 14, as well as the valve compartments 5 and 9 and the solenoid compartment 16. In addition, the interface between the body sections also intersects the flow passages or channels 6,8,11,12,13,15 and 17 which interconnect the compartments and the ports. Thus, the flow channels and the compartments for internal components are formed partially, but not necessary equally, in each body section 2a and 2b.

Ports 4, 7 and 14 are similar in construction and incorporate push-in connectors. In this regard a collet or sleeve 20 is located within each port and the outer end of the collet is provided with an outwardly extending

flange 21, which is located on the exterior of the valve body 1. As best shown in Fig. 6, the collet is provided with four equally spaced, flexible longitudinal legs 22, and each leg terminates in an enlarged head or tab 23 which is engaged with an annular shoulder 24 formed in body sections 2a and 2b of the valve body. The inner surface of each leg 22 can be formed with one or more barbs or teeth 25 which are adapted to engage the outer surface of a flow tube 26 to hold the tube within the port. The tube 26 is sealed within the port by an O-ring 27 which is located between the heads 23 of legs 22 and the internal shoulder 28 of the body. Insertion of tube 26 is limited by engagement of the end of the tube with the annular ledge 29 of the port.

With this construction, the valve body 1 itself forms the outer support for the collet 20 of the push-in connector and this eliminates the need for an outer fitting body which is required in conventional push-in type fittings. The fitting body is normally the most expensive part of the conventional push-in fitting. Not only does the invention eliminate the fitting body, but as the collet 20 is located within the valve body 1, as opposed to being mounted on the exterior of the valve body, a more compact unit is achieved.

A poppet valve unit 30 is mounted within the valve compartment 5. Valve unit 30 includes a valve disc 31 carried by a stem 32. Valve disc 31 can be moved between a pair of valve seats 33 and 34, each of which is mounted in mating grooves in body sections 2a and 2b.

Each valve seat 33,34 includes a metal backing ring 35 and a resilient facing ring or seal 36. The outer periphery of seal 36 is sealed against the valve body, while the outer face of each seal 36 is adapted to engage the respective face of the valve disc 31.

To center the valve stem 32 in compartment 5, the end of the stem 32 carries a spring 37, the peripheral edge of which is mounted within mating slits in the valve body sections 2a and 2b. The face of spring 37 is provided with a helical groove and will accommodate movement of the valve stem 32, while maintaining proper alignment of the valve stem and valve disc 31 within the compartments.

Mounted on the opposite end of valve stem 32 is a flexible resilient diaphragm 39 formed of rubber-like material and the peripheral edge of the diaphragm is mounted within mating grooves in body sections 2a and 2b through a rigid washer or ring 40.

During operation, valve stem 32 will move axially and this direction of movement is parallel to the interface between the two body sections 2a and 2b.

A valve unit 42 is mounted within the valve compartment 9, and valve unit 42 includes a valve disc 43 which is carried by stem 44, and is adapted to engage a valve seat 45 that is located in an annular groove in valve body 1 defined by mating groove portions in body sections 2a and 2b. Valve seat 45 is similar in construction to seats 33 and 34, and includes a rigid backing ring 46 and a resilient outer facing ring 47 which is adapted to engage and seal to valve disc 43.

Valve disc 43 is centered within the compartment 9 by a spring 48, similar in construction to spring 37, which is connected to valve disc 43 and the peripheral edge of the spring is seated within a slit formed in valve body sections 2a and 2b.

In addition to valve disc 43, a second valve disc 49 is carried by stem 44 and valve disc 49 is adapted to seat to engage valve seat 50, which is mounted within a groove in the valve body. The groove is defined by mating groove portions in body sections 2a and 2b. As in the case of valve seats 33 and 34, valve seat 50 includes a rigid backing ring 51 and an outer resilient sealing ring 52, which is adapted to be engaged by the valve disc 49.

The stem 44 along with valve disc 43 and 49 are connected to a flexible resilient diaphragm 53, which is mounted through mounting ring 54 within a groove in the valve body sections 2a and 2b.

With this construction, the outer surface of diaphragm 53, as well as the outer surface of diaphragm 39 are exposed to the pressure of the fluid in passage 17.

Valve unit 42 is adapted to move along the axis of stem 44 and this direction of movement is parallel to the interface between body sections 2a and 2b.

As a feature of the invention, a solenoid 56 is mounted within the solenoid compartment 16 and is encapsulated within the body 1. Solenoid 56 includes an annular coil 57 and a movable plunger 58 which is separated from the coil by a generally cylindrical housing 59. The outer end of plunger 58 carries a resilient seat 60, which will seat against the raised surface on head 61 of housing 59 under the influence of the plunger spring 75. Head 61 is provided with a laterally extending passage 61a which establishes communication between passage 15 and the plunger chamber of the solenoid. Head 61 is also formed with a pair of parallel bores 62 which connect passage 15 with chamber 65, via passage 61a and the plunger chamber, when solenoid coil 65 is energized. The outer periphery of head 61 is sealed to body 1 by O-ring seals 63.

A resilient disc 64 is mounted for movement within the upper section of chamber 65, and a pair of pins 66 extend through openings in head 61 and the outer ends of the pins project beyond the head 61 and engage the inner surface of the disc 64. A coil spring 67 is interposed between the outer surface of disc 64 and an internal shoulder or ledge 76 in chamber 65. A button 68 is mounted for axial movement within a chamber 69 that communicates with the upper section of chamber 65. Button 68 provides a manual override for the solenoid. By depressing button 68, disc 64 will correspondingly be moved inward and this movement will operate through pins 66 to lift the solenoid plunger 58.

As a further feature of the invention, exhaust silencing is incorporated in body 1. In this regard, body sections 2a and 2b, adjacent exhaust outlet 10, are provid-

ed with mating groove portions that define a groove or recess 71 which receives the peripheral edge of a plate or block 72 of silencing material, which can take the form of sintered bronze. With this construction the silencer 72 is entrapped between the body sections 2a and 2b during assembly of the valve body 1.

In operation of the valve, as associated with a fluid cylinder, air or other fluid under pressure is introduced into the inlet port 4 and in this mode of operation, the valve units 30 and 42 are in the position shown in Fig. 2. The air flows from port 4 into valve compartment 5 and then past valve seat 33 to passage 6 and from there the air flows through port 7 to one end of the cylinder. Concurrently, air is exhausted from the opposite end of the cylinder through port 14 where it flows through passage 13 to valve compartment 9. As valve disc 49 is open at this time, the air will be discharged through passage 11 to exhaust outlet 10.

When the solenoid 56 is energized, plunger 58 will be electro-magnetically raised, thus unseating the resilient disc 60 and connecting passage 15 through passage 61a to the solenoid chamber and then through holes 66 to the upper section of chamber 65. As the peripheral edge of the disc 64 is spaced from the wall of the chamber 65, the air will then flow around the disc 64 and to passage 17. The pressure of the air in passage 17 will then operate against both diaphragms 39 and 53 causing valve disc 31 to close on valve seat 33 and opening valve disc 43 while simultaneously closing valve 49. With valve disc 43 open, the pressurized air will flow from passage 8 through open valve disc 43, through port 14 to the fluid cylinder and air from the opposite end of the cylinder will be directed inwardly through port 7, through passage 6 past the open valve seat 34 into passage 12 and then through exhaust outlet 10.

When solenoid 56 is deenergized, the air pressure in channel 17 will be exhausted through a relief port 73 in head 61 and the valve units 30 and 42 will be returned to the position shown in Fig. 2.

As previously noted, the particular construction of the valves and channels, as illustrated in Fig. 2, is not critical and can take various forms. The construction shown in Fig. 2 is merely illustrative of a typical valve that can be produced in accordance with the invention.

In assembling the valve, one of the body sections 2a,2b is placed with the surface 3 facing upwardly and the various internal components, such as valve units 30 and 42, solenoid 56, valve seats, push-in fittings, etc., are then dropped into the open-sided recesses and grooves in the body section. The second body section is then placed on top of the first body section containing the internal components, and the two body sections are sealed together along interface 3. As a result, the internal components are automatically trapped in place, and all of the channels or passages are formed and sealed. Thus, no additional machining, port inserts, retaining caps, or assembly screws are required. Further, all of the electrical components, such as the solenoid 56, are encapsulated within the body and are shielded from outside environment.

As previously noted, the body sections can be sealed together through ultrasonic welding, or by chemical bonding, or by mechanical means.

The valve of the invention, while compact in size, has substantially improved power density because the flow channels or passages, although narrow, may be designed with considerable depth and also can be aerodynamically shaped. This shaping reduces turbulence by eliminating sharp corners and abrupt changes in the flow direction that normally impede the movement of fluids. As seen in Fig 4, the channels, such as 8, are preferably non-circular in cross section, with the long dimension of the cross section being normal to the interface between surfaces 3.

As all of the internal components are merely dropped into position in the recesses and grooves in the open surface of the body section, the assembly is substantially simplified over conventional valve constructions, which require components to be pushed into internal grooves and blind holes. Further, as the assembly of the body sections automatically traps and locates all internal parts, retaining caps and fasteners are not required.

With the silencing element being entrapped within the body, the design of the silencing element can be simplified. Moreover, the valve is more compact in that it eliminates the need for attaching auxiliary silencers to the outer surface of the valve.

The valve of the invention has substantially improved power density, compactness, and cost effectiveness, as compared to conventional valves. The invention allows the entire valve to be formed complete with all required internal components, passages, grooves and galleries, by simply placing the internal components in the open side of one body section and then bringing the two body sections together.

Claims

1. A valve construction comprising a body (1) including a plurality of body sections (2a,2b) each having an inner surface (3), said inner surfaces being disposed in contiguous relation along an interface, each inner surface having a plurality of channel portions each mating with complementary channel portions in the surface of the body section to form fluid channels, and means for introducing an operating fluid in said channels, characterised by:

   said channels forming a main fluid channel (4,6,8,11,12,14) and a pilot channel (15,17), valve means (30,42) mounted for movement in said main channel (8) for controlling the flow of fluid through said main channel, and pressure responsive pilot means (39,53) communicating with said pilot chan-

nel (15,17) and operably connected to said valve means (30,42) and responsive to a predetermined pressure of said fluid in said pilot channel (15,17) for moving said valve means in said main fluid channel to thereby control the flow of fluid in said main channel.

2. The valve construction of claim 1, wherein said pressure responsive pilot means (39,53) comprises a diaphragm exposed to said pilot channel (15,17) and connected to said valve means (39,53).

3. The valve construction of claim 1, and including second valve means (60) disposed in said pilot channel (15,17) to control the flow of fluid therein, said second valve means being operable through external stimuli (56) to control the flow of fluid in said pilot channel.

4. The valve construction of claim 1, wherein the valve means (30) includes a valve element (31) mounted to move in a direction parallel to the plane of said interface.

5. The valve construction of claim 4, and including a valve seat (33,34) mounted in mating channel portions of each body section, said movable valve element (31) disposed to engage said seat.

6. The valve construction of claim 1, wherein each inner surface (3) has a plurality of port sections each mating with a complementing port section in the inner surface of the other body section to form ports (4,7,10,14) that establishes communication between said channels and the exterior of said valve body.

7. The valve construction of claim 6, wherein a first of said ports comprises an inlet (4) for the introduction of fluid to said body, a second of said ports comprises an outlet (7), and a third of said ports comprises an exhaust port (10).

8. The valve construction of claim 7, and including silencing means (72) disposed within said body and extending across said exhaust port (10).

9. The valve construction of claim 8, wherein each surface (3) is provided with a groove section adjacent said exhaust port to mate with and complement a groove section in the other surface to form a groove (71), said silencing means (72) being disposed within said groove.

10. The valve construction of claim 9, wherein said silencing means (72) is composed of sintered material.

11. The valve construction of claim 6, and including a connector (20) disposed in at least one of said ports (4,7,14), said connector (20) comprising a flexible cylindrical section (22) disposed in said port and an enlarged inner section (23), said body having an internal abutment (28) bordering said port, the enlarged inner section (23) of said connector (20) engaged with said abutment (28) to prevent axial displacement of said connector from said port, and a plurality of surface deviations (25) disposed on the inner surface of said cylindrical section (20) and disposed to engage a tube (26) inserted within said port.

12. The valve construction of claim 11, wherein the surface deviations (25) are barbs.

13. The valve construction of claim 1, wherein at least one of the channels (8) is non-circular in cross section and has a long dimension and a short dimension, said long dimension being disposed normal to the plane of said interface.

14. The valve construction of claim 3, wherein said second valve means (60) is a solenoid valve.

Patentansprüche

1. Ventilkonstruktion, die einen Körper (1), der eine Mehrzahl von Körperteilstücken (2a, 2b) umfaßt, die jeweils eine innere Oberfläche (3) aufweisen, wobei die inneren Oberflächen in sich berührender Beziehung längs einer Grenzfläche angeordnet sind, wobei jede innere Oberfläche eine Mehrzahl von Kanalabschnitten aufweist, die jeweils mit komplementären Kanalabschnitten in der Oberfläche des Körperteilstücks zusammenpassen, um Fluidkanäle zu bilden, und Mittel für das Einleiten eines Betriebsfluids in die Kanäle aufweist, dadurch **gekennzeichnet,** daß die Kanäle einen Hauptfluidkanal (4, 6, 8, 11, 12, 14) und einen Vorsteuerkanal (15, 17) bilden, daß Ventilmittel (30, 42) in dem Hauptkanal (8) beweglich angebracht sind, um die Strömung von Fluid durch diesen Hauptkanal zu steuern, und daß auf Druck ansprechende Vorsteuermittel (39, 53), die mit dem Vorsteuerkanal (15, 17) in Verbindung stehen, vorgesehen sind und mit den Ventilmitteln (30, 42) betätigend verbunden sind und auf einen vorbestimmten Druck des Fluids in dem Vorsteuerkanal (15, 17) ansprechen, um die Ventilmittel in dem Hauptfluidkanal zu bewegen, so daß hierdurch die Strömung von Fluid in diesem Hauptkanal gesteuert wird.

2. Ventilkonstruktion nach Anspruch 1, dadurch **gekennzeichnet,** daß die auf Druck ansprechenden Vorsteuermittel (39, 53) eine Membran umfassen,

die dem Vorsteuerkanal (15, 17) ausgesetzt und mit den Ventilmitteln (39, 53) verbunden ist.

3. Ventilkonstruktion nach Anspruch 1, dadurch **gekennzeichnet,** daß sie zweite Ventilmittel (60) aufweist, die in dem Vorsteuerkanal (15, 17) angeordnet sind, um die Strömung von Fluid darin zu steuern, und daß die zweiten Ventilmittel durch externe Reize (56) betätigbar sind, um die Strömung von Fluid in dem Vorsteuerkanal zu steuern.

4. Ventilkonstruktion nach Anspruch 1, dadurch **gekennzeichnet,** daß das Ventilmittel (30) ein Ventilelement (31) aufweist, das so angebracht ist, daß es sich in einer zu der Ebene der Grenzfläche parallelen Richtung bewegt.

5. Ventilkonstruktion nach Anspruch 4, dadurch **gekennzeichnet,** daß sie einen Ventilsitz (33, 34) aufweist, der in zusammenpassenden Kanalabschnitten jedes Körperteilstücks angebracht ist, und daß das bewegliche Ventilelement (31) so angeordnet ist, daß es in Eingriff mit dem Sitz steht.

6. Ventilkonstruktion nach Anspruch 1, dadurch **gekennzeichnet,** daß jede innere Oberfläche (3) eine Mehrzahl von Öffnungsteilstücken aufweist, die jeweils mit einem komplementären Öffnungsteilstück in der inneren Oberfläche des andern Körperteilstücks zusammenpassen, um Öffnungen (4, 7, 10, 14) zu bilden, die eine Verbindung zwischen den Kanälen und dem Äußeren des Ventilkörpers herstellen.

7. Ventilkonstruktion nach Anspruch 6, dadurch **gekennzeichnet,** daß eine erste der Öffnungen einen Einlaß (4) für die Einleitung von Fluid in den Körper umfaßt, eine zweite der Öffnungen einen Auslaß (7) umfaßt, und eine dritte der Öffnungen eine Abzugsöffnung (10) umfaßt.

8. Ventilkonstruktion nach Anspruch 7, dadurch **gekennzeichnet,** daß sie geräuschdämpfende Mittel (72) aufweist, die im Inneren des Körpers angeordnet sind und sich über die Abzugsöffnung (10) hinweg erstrecken.

9. Ventilkonstruktion nach Anspruch 8, dadurch **gekennzeichnet,** daß jede Oberfläche (3) mit einem Nutteilstück versehen ist, das an die Abzugsöffnung angrenzt und dazu dient, mit einem Nutteilstück in der anderen Oberfläche zusammenzupassen und dieses zu ergänzen, um eine Nut (71) zu bilden, und daß die geräuschdämpfenden Mittel (72) im Inneren der Nut angeordnet sind.

10. Ventilkonstruktion nach Anspruch 9, dadurch **gekennzeichnet,** daß das geräuschdämpfende Mittel (72) sich aus gesintertem Material zusammensetzt.

11. Ventilkonstruktion nach Anspruch 6, dadurch **gekennzeichnet,** daß sie ein Verbindungsglied (20) aufweist, das in wenigstens einer der Öffnungen (4, 7, 14) angeordnet ist, daß das Verbindungsglied (20) ein flexibles zylindrisches Teilstück (22), das in der Öffnung angeordnet ist, und ein erweitertes inneres Teilstück (23) aufweist, daß der Körper ein inneres Widerlager (28) aufweist, das die Öffnung einfaßt, daß das erweiterte Teilstück (23) des Verbindungsglieds (20) in Eingriff mit dem Widerlager (28) steht, um eine axiale Verschiebung des Verbindungsglieds von der Öffnung zu verhindern, und daß eine Mehrzahl von Oberflächenabweichungen (25) an der inneren Oberfläche des zylindrischen Teilstücks (20) angeordnet sind und so angeordnet sind, daß sie ein in die Öffnung eingesetztes Rohr (26) ergreifen.

12. Ventilkonstruktion nach Anspruch 11, dadurch **gekennzeichnet,** daß die Oberflächenabweichungen (25) Widerhaken sind.

13. Ventilkonstruktion nach Anspruch 1, dadurch **gekennzeichnet,** daß wenigstens einer der Kanäle (8) im Querschnitt nichtkreisförmig ist und eine lange Ausdehnung und eine kurze Ausdehnung aufweist, und daß die lange Ausdehnung normal zu der Ebene der Grenzfläche angeordnet ist.

14. Ventilkonstruktion nach Anspruch 3, dadurch **gekennzeichnet,** daß das zweite Ventilmittel (60) ein Magnetventil ist.

Revendications

1. Construction de distributeur comprenant un corps (1) comportant plusieurs sections de corps (2a, 2b), chacune ayant une surface intérieure (3), lesdites surfaces intérieures étant disposées en relation de contiguïté le long d'une interface, chaque surface intérieure comprenant plusieurs éléments de canaux dont chacun correspond à des éléments complémentaires de canaux situés dans la surface de la section de corps de manière à former des canaux à fluide et un moyen pour introduire un fluide d'actionnement dans lesdits canaux, caractérisée en ce que
lesdits canaux forment un canal principal à fluide (4, 6, 8, 11, 12, 14) et un canal pilote (15, 17), un moyen de soupape (30, 42) est monté déplaçable dans ledit canal principal (8) pour commander l'écoulement de fluide dans ledit canal principal et un moyen pilote (39, 53) sensible à la pression, communiquant avec ledit canal pilote (15, 17), relié fonctionnellement audit moyen de soupape (30, 42)

et répondant à une pression prédéterminée dudit fluide situé dans ledit canal pilote (15, 17) pour déplacer ledit moyen de soupape dans ledit canal principal à fluide de manière à commander ainsi l'écoulement du fluide dans ledit canal principal.

2. Construction de distributeur selon la revendication 1, dans lequel ledit moyen pilote (39, 53) sensible à la pression consiste en un diaphragme à découvert sur ledit canal pilote (15, 17) et relié audit moyen de soupape (39, 53).

3. Construction de distributeur selon la revendication 1 et comprenant un second moyen de soupape (60) disposé dans ledit canal pilote (15, 17) pour y commander l'écoulement de fluide, ledit second moyen de soupape pouvant être actionné par des agents dynamiques extérieurs (56) pour commander l'écoulement de fluide dans ledit canal pilote.

4. Construction de distributeur selon la revendication 1, dans laquelle le moyen de soupape (30) comprend un élément de soupape (31) monté de manière à se déplacer dans une direction parallèle au plan de ladite interface.

5. Construction de distributeur selon la revendication 4 et comprenant un siège de soupape (33, 34) monté dans des éléments de canaux qui se correspondent et font partie de chaque section de corps, ledit élément mobile de soupape (31) étant disposé de manière à coopérer avec ledit siège.

6. Construction de distributeur selon la revendication 1, dans laquelle chaque surface intérieure (3) comprend plusieurs sections d'orifice dont chacune est en correspondance avec une section complémentaire d'orifice située dans la surface intérieure de l'autre section de corps de manière à former des orifices (4, 7, 10, 14) qui établissent la communication entre lesdits canaux et l'extérieur dudit corps de distributeur.

7. Construction de distributeur selon la revendication 6, dans laquelle un premier desdits orifices consiste en une admission (4) pour l'introduction de fluide dans ledit corps. un deuxième desdits orifices consiste en une sortie (7) et un troisième desdits orifices consiste en un orifice d'échappement (10).

8. Construction de distributeur selon la revendication 7 et comprenant un moyen de silencieux (72) disposé dans ledit corps et placé en travers dudit orifice d'échappement (10).

9. Construction de distributeur selon la revendication 8, dans laquelle chaque surface (3) comprend un section de rainure voisine dudit orifice d'échappement et réalisée de manière à se raccorder à et à compléter une section de rainure située dans l'autre surface afin de former une rainure (71), ledit moyen de silencieux (72) étant disposé dans ladite rainure.

10. Construction de distributeur selon la revendication 9, dans laquelle ledit moyen de silencieux (72) est composé de matière frittée.

11. Construction de distributeur selon la revendication 6 et comprenant un raccord (20) disposé dans au moins l'un desdits orifices (4, 7, 14), ledit raccord (20) consistant en une section cylindrique de flexible (22) disposée dans ledit orifice et une section intérieure élargie (23), ledit corps comportant une butée intérieure (28) voisine dudit orifice, la section intérieure élargie (23) dudit raccord (20) étant en appui contre ladite butée (28) pour empêcher un déplacement axial dudit raccord par rapport audit orifice, ainsi que plusieurs déformations de surface (25) situées dans la surface intérieure de ladite section cylindrique (20) et disposées pour s'appliquer contre un tube (26) introduit dans ledit orifice.

12. Construction de distributeur selon la revendication 11, dans laquelle les déformations de surface (25) sont des pointes.

13. Construction de distributeur selon la revendication 1, dans laquelle au moins l'un des canaux (8) a une section transversale qui n'est pas circulaire et comprend une dimension longue et une dimension courte, ladite dimension longue étant disposée perpendiculairement au plan de ladite interface.

14. Construction de distributeur selon la revendication 3, dans laquelle ledit second moyen de soupape (60) est une électrovanne.

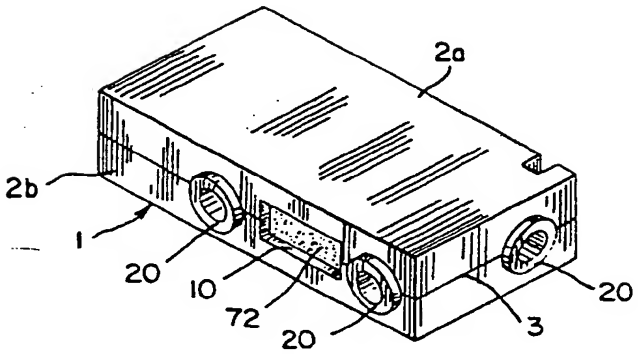

FIG. 1

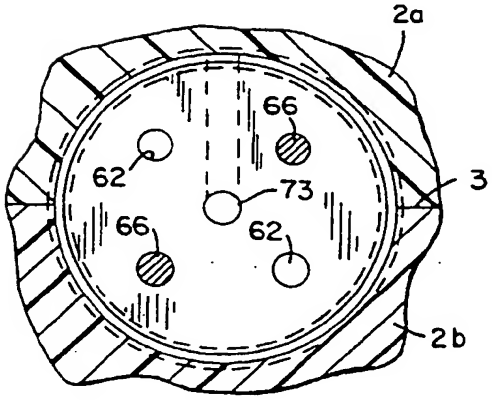

FIG. 3

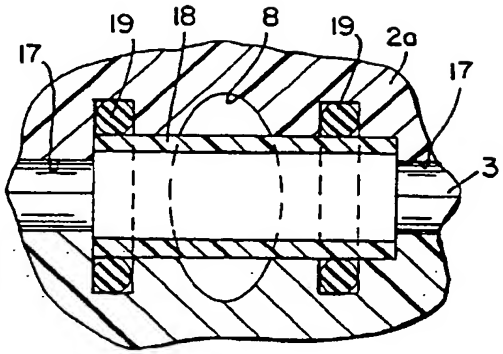

FIG. 4

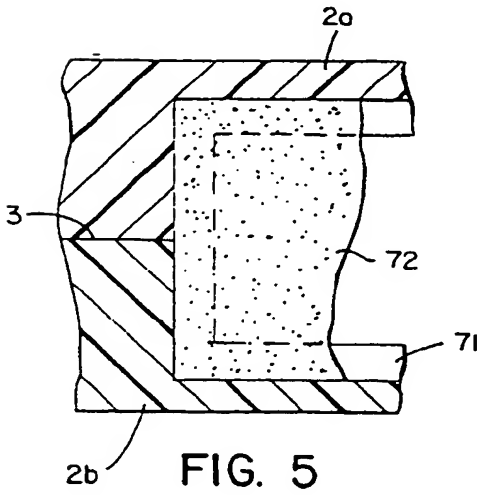

FIG. 5

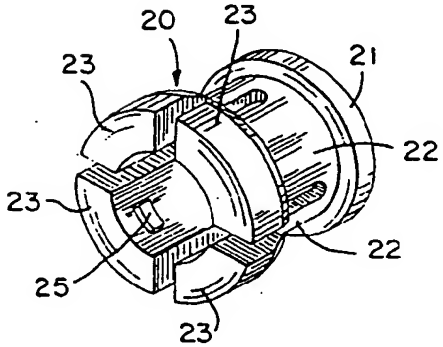

FIG. 6

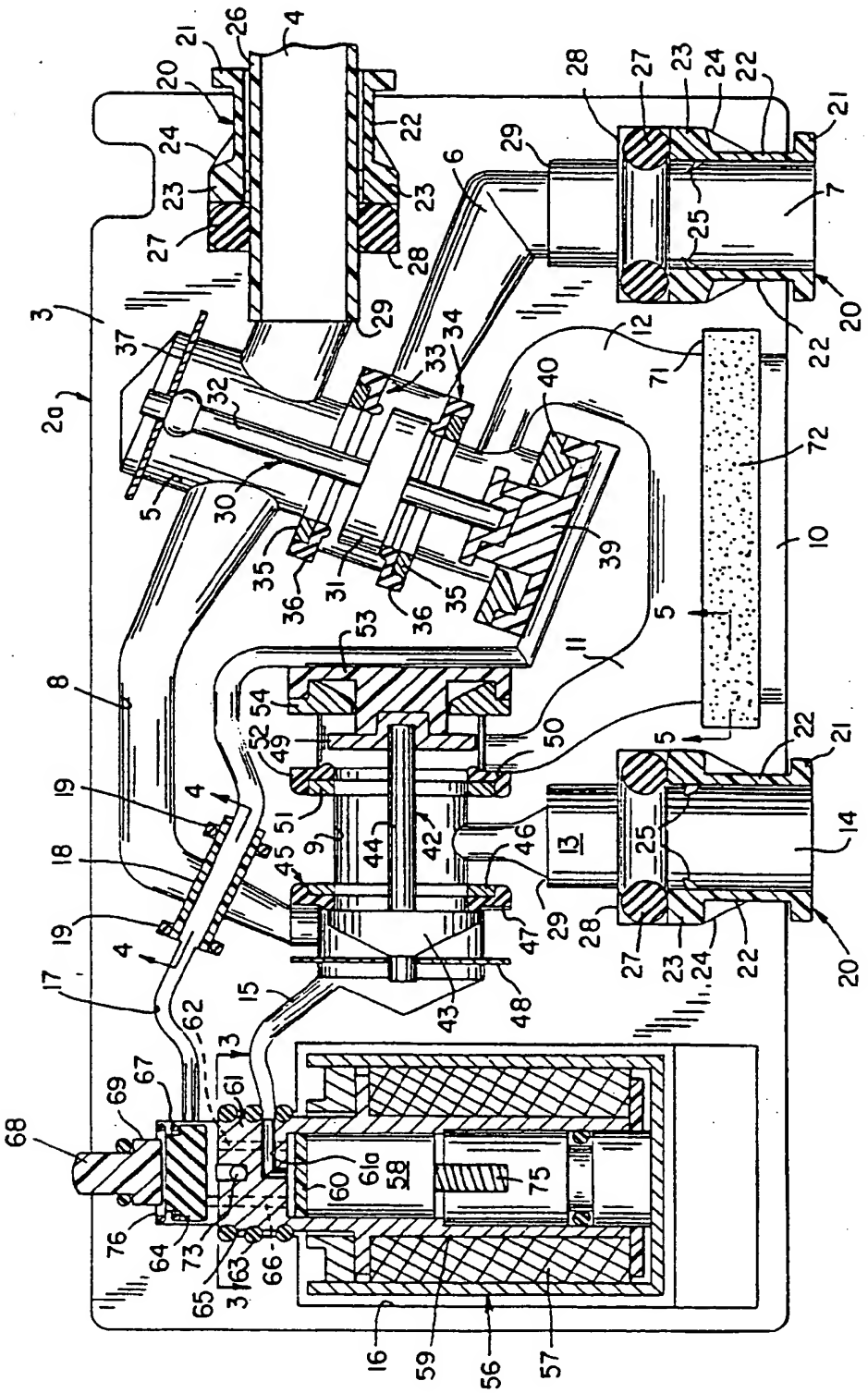

FIG. 2